ORIGINAL ARTICLE

AGnES: Supporting General Practitioners With Qualified Medical Practice Personnel

Model Project Evaluation Regarding Quality and Acceptance

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SUMMARY

Background: The German AGnES (community-based, e-health-assisted systemic support for primary care) project allows general practitioners (GPs) to delegate certain elements of medical care, including house calls, to qualified AGnES employees and thereby provide primary care to a larger number of patients. AGnES projects of various types have been carried out in a number of German federal states from 2005 onward. In this article, an evaluation of the AGnES projects to date is presented.

Methods: Patient data (age, sex, diagnoses, level of care, mobility, etc.) and each of the specific activities carried out in the AGnES framework were documented with standardized computer-based instruments. The GPs, AGnES employees, and patients also underwent standardized interviews. The acceptance of the AGnES project, competence of the AGnES employees, and quality of medical care within the projects were evaluated. The participating GPs themselves assessed the quality of medical care.

Results: By July 8, 2008, 8386 house calls on a total of 1486 patients had been made within the framework of the AGnES projects. The evaluation revealed a high degree of acceptance of the project among the participating GPs, AGnES employees, and patients. The GPs considered the quality of medical care within the AGnES project to be good for the vast majority of patients.

Conclusion: Structural redundancy is avoided by directly placing the AGnES employees in the general practitioners' practices. Based on the results of the AGnES projects, the law in Germany has now been amended to enable implementation of the AGnES project in the regular health care system from January 2009 onward. The next steps to be taken are the establishment of adequate reimbursement within the catalog of the statutory health insurance scheme and a detailed definition of the required qualifications.

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Key words: AGnES, delegation of medical care, primary care, medical practice personnel, physician shortage

Demographic developments, especially the aging of the baby boomer generations and rising life expectancy, are leading to an increasing proportion of elderly in Germany's total population. The proportion of persons aged 80 years old or over will grow to 7.4% by 2020 (in 2005: 4.5% [1]). In the rural areas of the new German federal states, this trend will be intensified even further by the emigration of young persons. Based on current estimates, for example, by 2020 the proportion of persons aged 80 years or over will increase to 8.2% in Brandenburg (2), to 8.6% in Mecklenburg-Western Pomerania (3), and to 9.6% in Saxony (4).

This change in the age structure is having a considerable impact on patient numbers, especially as regards age-associated chronic diseases and multimorbidity (5, 6). Age-related increasing morbidity and decreasing mobility will create an increasing demand for, among other things, physician house calls.

The age structure of general/family practitioners in private practice (GPs) is showing a similar trend to that of the general population. By 2011, about one third of private practice GPs will have entered retirement (7). By 2020, in Mecklenburg-Western Pomerania for example, about 40% of these primary practice positions will need to be refilled, even assuming a retirement age of 68 years (own data).

Since the increased demands placed on the primary medical care system as a consequence of the aging of the population are also exacerbating the problems many GPs experience with finding a successor, relevant deficits in outpatient primary medical care are already anticipated within a few years in some regions.

AGnES: community-based, e-health-assisted systemic support for primary care

The AGnES project is based on the delegation of certain components of medical care, especially house calls. In areas with an anticipated or existing shortage of primary medical care, AGnES can support individual GPs in providing care for a larger panel of patients and/or a larger area (8).

The specific competencies of qualified AGnES employees have not yet been formalized either by law or

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TABLE 1

The AGnES practice projects

Project	Mecklenburg-Western Pomerania Phase 1–3	Mecklenburg-Western Pomerania Phase 4	Brandenburg	Saxony	Saxony-Anhalt (MoPra)
Scheduled run time	08/05–03/07 (3 phases)	07/07–12/08	07/06–12/08	03/07–12/08	12/07–07/08
Funding	– Ministry of Health and Social Affairs	– Ministry of Health and Social Security – ASHIP	– ESF – Ministry of Labor, Social Affairs, Health, and the Family	– ESF – Ministry of Social Affairs – ASHIP – Health insurance funds	– Ministry of Health and Social Affairs – ASHIP – AOK
Project management	ICM Greifswald	ICM Greifswald ASHIP	ICM Greifswald	ICM Greifswald	ICM Greifswald ASHIP
Qualified AGnES personel of whom primary qualified – health and nursing care – medical assistant/medical employee	3 –	2 1	3 –	2 4	8 1
Physicians	2	20	5	8	6

Added to which are 14 qualified AGnES employees from the project: Learning Curriculum Community Medicine Nursing (1 Jan 2006 to 31 December 2007, Sponsor: EQUAL/InCareNet);
ASHIP, Association of Statutory Health Insurance Physicians;
ICM, Institute for Community Medicine;
ESF, European Social Fund; AOK, a large general statutory health insurance company
MoPra, mobile practice assistant

otherwise. They depend on the primary qualification (nurse or medical assistant), professional experience, and further qualifications. The competencies are defined by the patients' characteristics (age, mobility, diagnoses, care level) and the nature of the delegated activities.

The delegation of house calls to practice employees is already possible, but receives only a low level of remuneration and makes no structural contribution to primary medical care.

Besides the standardized monitoring of the patient's state of health, the performance of medically delegated activities and the provision of counseling on specific topics, modules have been developed for the following aspects:

- Medication monitoring (in cooperation with local pharmacists)
- Fall prevention (including home inspection)
- Telecare (telemedical devices for suitable patients at home [9])
- Telemedicine (use of mobile video conference systems)
- Geriatric assessment
- Palliative medicine.

The implementation, documentation requirements, definition of services suitable for delegation, as well as contractual and organizational aspects of the AGnES project have been developed and tried out in private practice projects in four different German federal states *(table 1)*.

The AGnES model projects were evaluated on a standardized basis with reference to the following topics:

- Acceptance of the project
- Competencies of the AGnES employees
- Quality of care.

The results of this evaluation are presented in this article.

Methods

The basic principle underlying all primary care practice projects is the delegation of primary care services to qualified practice employees. The projects exhibit specific differences in relation to each other. The initial projects AGnES Mecklenburg-Western Pomerania Phase 1 to 3 focused on feasibility in terms of content and organization. In Brandenburg, the project was developed further in cooperation with a medical care center and the number of delegated activities was considerably increased. Saxony was the federal state in which the project was first implemented in primary care practices in areas with existing and impending shortages of medical care. In project Phase 4 in Mecklenburg-Western Pomerania, the model was put into practice in local networks of GP practices: in these cases, the qualified AGnES personnel work not only for their "core practice" but also for other GPs in the region.

The projects in Saxony and Mecklenburg-Western Pomerania Phase 4 were sponsored in terms of both

TABLE 2

Characteristics of the patients in the different projects (as in July 2008)

Project	Mecklenburg-Western Pomerania Phase 1–3	Mecklenburg-Western Pomerania Phase 4	Brandenburg	Saxony	Saxony-Anhalt (MoPra)	Curriculum Neubrandenburg
Number of patients (n)	105	354	326	310	209	182
Women (n)	76	242	214	229	161	127
Men (n)	29	112	112	81	48	55
Age, mean (years)	73.3	77.7	77.2	81.2	79.9	79.5
Age, range (years)	37–92	27–100	21–100	43–98	49–99	38–107
Mobility status						
Obligate house call patient*1	29	284	71	129	175	116
On demand house call patient*2	37	54	188	170	34	59
Practice attendance patient *3	17	16	67	11	–	5
Unknown	22	–	–	–	–	2

*1 obligate house call patient: mobility lost
*2 on demand house call patient: restricted mobility
*3 practice attendance patient: house call for optimization of treatment
MoPra, mobile practice assistant

funding and content by the Associations of Statutory Health Insurance Physicians and the health insurance funds of the various states. A more advanced funding concept is currently being implemented in Saxony-Anhalt; in this case, the participating GPs can charge the National Association of Statutory Health Insurance Physicians and the AOK (a large general statutory health insurance company) for delegated house calls on the basis of an Agreement to Implement a Model Project pursuant to Sections 63 ff of the Fifth Book of the German Social Security Code.

The participating GPs determine themselves which patients can be included in the projects, as well as the frequency and distribution of the house calls between the qualified AGnES personnel and the physician.

All activities of the AGnES intervention are recorded in a standardized manner using specially developed documentation software (Karopka T et al.: ICT Architecture for a community medicine nurse support project. Proceedings of the First International Conference on Health Informatics, Funchal, Madeira, Portugal, 28–31 January 2008; pp. 26–30; Volume of Abstracts). The data recorded during the house calls are entered directly in the patient's home on a Tablet PC. The data are encrypted and transmitted via a secure internet connection (VPN, virtual private network) to the Institute for Community Medicine where they are checked for completeness and plausibility.

The acceptance of the project was surveyed among GPs, AGnES employees and patients using standardized questionnaires. GPs were also requested to provide information regarding the degree of workload relief provided by AGnES, the required and actual competencies of the AGnES employees, and the quality of medical care.

Results

Activities among patients

On the reference date 8 July 2008, 1486 patients had participated in one of the AGnES projects. The average patient age was 78.6 years (range, 21 to 107 years). The patients are described in *table 2*.

91% of the patients were immobile or only partly mobile. The remaining 9% would in principle have been capable of attending the practice but were visited at home for reasons such as treatment monitoring or other medically specified indications such as recording of diurnal variation in parameters such as blood pressure or blood glucose, assessment of the care situation at home or the social environment. The majority of participating patients were multimorbid (94.2%) (6). The mean number of diagnoses per patient was six (range, 1 to 27). The commonest diagnoses were

- hypertension (66%),
- diabetes (43%),
- coronary heart disease (24%),
- musculoskeletal diseases (22%),
- malignancies (14%),
- heart failure (13%), and
- dementia (13%).

The 53 participating GPs delegated 8386 house calls to 38 qualified AGnES employees—of whom 32

TABLE 3

Standardized evaluation questionnaire (physicians)

Question:
Does your panel of patients include house call patients that you do not delegate to AGnES in the model project? If so, please state the reason.

Reason	n
Capacity of AGnES	12
Patient's serious illness	11
Other reasons	6
Patient's request	5
Family's request	4
Distance to / accessibility of patient	4
Insufficient specialized competence of AGnES	2

27 physicians from the projects Mecklenburg-Western Pomerania Phase 4, Brandenburg, Saxony and Saxony-Anhalt, multiple selections possible

TABLE 4

Standardized evaluation questionnaire (physicians)

Question:
Why are you continuing to make house calls yourself to patients who are also visited by AGnES?

Reason	n
Acute exacerbation of disease	31
Changed frequency of house calls	29
Impending hospitalization	22
Patient's serious medical condition	21
Post hospital discharge care	17
Change in therapy	15
Patient's request	14
Maintaining doctor-patient contact	13
Complex treatment measures	9
Family's request	6
Other reasons	3
Insufficient specialized competence of AGnES	3
Lack of time for coordination with GP	1

42 physicians from the projects Mecklenburg-Western Pomerania Phase 1–4, Curriculum Project Neubrandenburg, Brandenburg, Saxony, and Saxony-Anhalt, multiple selections possible

were nurses and 6 medical assistants. About 300 different tasks were recorded (status July 2008). About 50% of the activities concerned the recording of diagnostic parameters such as blood pressure and blood glucose values, weight, peak flow, body temperature, or ECG.

Approximately 35% of these activities comprised the assessment of physical and mental state and the documentation of disease symptoms and medically relevant events such as falls, accidents, changes in social environment, medication-related problems and care level assessment by the Medical Service of the Statutory Health Insurance Companies (MDK). Also included were counseling on health-related issues such as fluid intake, diet or the use of therapeutic products and assistive devices.

Further activities comprised medical tasks such as collecting blood samples, administering injections, and the treatment of wounds and pressure sores. Common to all these activities is that they are part of the patient's medical care, are necessary and can be delegated to the qualified AGnES employee as a means of lightening the GP's workload. Domiciliary nursing as well as core medical activities such as diagnostic or therapeutic decisions, on the other hand, are not among the functions of an AGnES employee.

Frequency of house calls and acceptance

Of the 53 GPs in the AGnES projects, 42 completed a standardized evaluation questionnaire. In addition, detailed questionnaires on the topic "Effect of AGnES on practice operation" were available from 27 of 39 physicians of the Mecklenburg-Western Pomerania Phase 4, Brandenburg, Saxony, and Saxony-Anhalt projects.

These 27 GPs each had an average of 90 house call patients (range, 10 to 380) who were visited at least once per quarter. For an average 67% (n = 60, range 0 to 345) of these patients, the GPs were of the opinion that part of the necessary house calls could be carried out by the qualified AGnES employees. The main reasons for the project physicians not delegating house calls to practice personnel in an average of one third of all house call patients included the presence of serious illnesses and the exhausted capacity of AGnES *(table 3)*. In answering these questions, the physicians were able to choose from predefined categories, with the additional option to state reasons in free text.

In the majority of patients (15% to 100%, depending on the GP) for whom house calls were delegated to practice staff, the treating GP also made house calls him/herself. The rationale for this is presented in *table 4*. The main reasons were impending hospitalization and acute exacerbations of disease. 29 of the 42 GPs (69%) reduced the frequency of house calls. The house calls no longer carried out were assumed by the qualified AGnES employee.

Most GPs (38 of 42) found that the AGnES project had a positive effect on their workload. Similarly, 37 of

42 GPs took the view that the qualified AGnES employee house calls had a positive influence on patient compliance *(table 5)*. Compliance data were recorded in a standardized fashion as part of the medication module. Initial evaluations also reveal beneficial effects in this area, for example as regards the mode and timing of taking medication (Fiß T et al.: Das Modul Pharmazeutische Betreuung in AGnES 3. Prävention und Gesundheitsförderung 2007: 2 [Suppl.] 102; Abstract).

The patient evaluation of the projects was performed between December 2007 and March 2008. All patients from the ongoing projects who had participated for at least two months (n = 992) were included. 67% of the distributed questionnaires were returned completed (n = 667). 34 patients died before the questionnaires were returned, and 22 patients were not capable of answering the questions for health reasons.

The acceptance of the AGnES project was very high. 629 of the 667 patients (94.3%) could imagine a qualified AGnES employee making house calls and performing special tasks such as fall prevention and telemedicine, and that the GP need only make house calls in cases of urgent medical necessity. 658 of the 667 patients (98.7%) expressed the opinion that the qualified AGnES employee is often (n = 99, 14.8%) or always (n = 559, 83.8%) a competent contact person for health-related topics.

TABLE 5

Standardized evaluation questionnaire (physicians)

Rating of the statements: "AGnES positively influences the patient's compliance" and "AGnES relieves the physician's workload" (n = 42 physicians)

	"AGnES relieves the physician's workload"	"AGnES positively influences the patient's compliance"
	n	n
Agree very much	27	27
Quite agree	11	0
Partly agree	2	4
Hardly agree	1	-
Don't agree	1	1

Quality of medical care

The GPs were requested to rate the following statement for every project patient:

"The shared medical care of the patient by the GP and AGnES (on a delegated basis) during the project period to date showed a similar quality to that of conventional primary medical care" (project period to date: time between start of project and time of survey; depending on the project, between 2 months [Mecklenburg-Western Pomerania Phase **2]** and 1.5 years [Brandenburg]).

The question was answered for 657 patients. For 92.1% of these patients, this statement was rated as "very much agree" (n = 503) or "quite agree" (n = 102) by the participating GPs *(table 6)*.

Relief of GP workload

The results of the model projects were used to calculate the capacity of a qualified AGnES employee. Main parameters were

- complete time required for the house call (average 23 minutes);
- distance traveled per house call (average 8.4 kilometers);
- preparation and follow-up of house calls (about 16 minutes per house call), for example
  - handover briefings with the GP
  - arranging appointments with the patient
  - preparation of blood sample tubes
  - liaison with nursing service and pharmacist.

Under model conditions, this was extrapolated to a capacity of about 1200 house calls per year. The capacity freed by the resulting relief of GP workload (about 500 hours per year) can then be devoted to treating additional patients.

Cooperation with nursing services

Nursing is not among the tasks of the qualified AGnES employee. The assumption of medical tasks by delegation from the GP, however, expressly includes patients in need of nursing care. Up to 43% of the house calls in the projects concerned involved patients requiring nursing care (care level known in 1119 patients, of whom without care level, n = 635; care level 1, n = 283; care level 2, n = 165; care level 3, n = 36). In many of these cases, the qualified AGnES employee acted as an important interface to the various nursing services.

So far, new or increased nursing care needs (as defined in the Fifth and/or Eleventh Book of the German Social Security Code, status April 2008) have been identified in 109 patients in the ongoing projects in Mecklenburg-Western Pomerania, Brandenburg, and Saxony. For

TABLE 6

Standardized evaluation questionnaire (physicians)

Rating of the statement: "The shared medical care of the patient by the GP and AGnES (on a delegated basis) during the project period to date showed a similar quality to that of conventional primary medical care"

	Number of patients (%)
Agree very much	503 (76.6)
Quite agree	102 (15.5)
Partly agree	32 (4.9)
Hardly agree	9 (1.4)
Don't agree	9 (1.4)
No data	2 (0.3)
Total	657 (100)

BOX

Legal framework conditions

Under the terms of the Nursing Care Advancement Act (adopted by the German Federal Parliament on 14 March 2008), Section 87 2b of the Fifth Book of the German Social Security Code was amended with the following supplement at the initiative of the "AGnES Steering Group" in which representatives of all social ministries of the new German federal states cooperate:

"At the latest by 31 October 2008 and with effect from 1 January 2009, a regulation is to be introduced whereby medically directed assistance by other persons pursuant to Section 28 Subsection 1 Para. 2 which is provided at the patient's home in the physician's absence is to be remunerated".

The comments of the German Federal Council on this amendment of the Act of 30 November 2007 refer explicitly to the AGnES project as a model for the delegation of medical services in the domiciliary setting (German Federal Council publication 718/1/07).

example, overburdening of relatives was identified, assistance in applying for a care level was provided, and the need for nursing in wound management or administering medications were established. As a consequence, a nursing service was subsequently integrated into the patient's care program in most cases.

Discussion and prospects

Considering the high relevance for medical practice, the AGnES project has stimulated great interest. Aspects of central relevance were seen to be

- the relevance of the project for solving problems of delivering medical care in rural areas;
- the legal framework conditions *(box)*;
- interfaces to other health care professions;
- curricular contents of the required qualifications of the qualified AGnES employees;
- funding of AGnES in the regular health care system.

Relevance for rural areas with health care shortages

It is evident from the project described that it is not the goal of AGnES either to replace private practice physicians or to substitute components of primary medical care delivery with other professional groups. The underlying philosophy is rather to delegate medical services under the GP's responsibility. Since domiciliary nursing is explicitly not among the tasks of AGnES, there is no competition with nursing services. On the contrary, in many cases new or increased nursing requirements were identified and a nursing service called in.

The aim of the AGnES project is rather to contribute, through innovative options of interdisciplinary cooperation between GPs and qualified medical personnel, to securing outpatient medical care in regions facing shortfalls in medical care provision.

The results of the model projects suggest that the AGnES project can effectively improve the situation of primary medical care in regions at risk of deficient levels of medical care delivery.

The evaluation demonstrates the high acceptance of AGnES among the participating patients. The project design meant that the choice of patients was solely the prerogative of the GPs. It is therefore uncertain to what extent these results are representative of all the patients as a whole. The acceptance, however, is coupled to the certainty that in cases of medical necessity the house calls will be made by the physicians themselves.

During the project phase, the majority of participating GPs already experienced the support provided by the qualified AGnES employees as relieving their workload. They also rated the quality of medical care as high and for most patients as equivalent to conventional primary medical care. The majority of physicians were also of the opinion that the project had a positive influence on their patients' compliance.

At the 111th German Physicians' Congress (Ulm, 20 to 23 May 2008), the delegates for the first time came out clearly in favor of increasingly delegating activities to other health care professionals. The essential precondition, however, is that the physician retains overall therapeutic responsibility. Substitution of medical services was rejected. In the decision memorandum of the 111th German Physicians' Congress, the AGnES projects were cited as positive examples of innovative delegation projects (10).

Limitations

The quality of medical care was rated by the participating GPs as part of the described evaluation. In further steps, objective parameters for quality measurement, such as blood pressure values and patient quality of life, were evaluated.

The AGnES projects were devised as feasibility and qualification projects.

Since no control group so far exists with which the project results can be compared, in a next step secondary data will be requested from the health insurance funds and the Associations of Statutory Health Insurance Physicians in the various German federal states. The aim is to mount comparisons between project patients and other insured persons of the participating medical practices (for example the ratio between the number of physician/qualified AGnES employee house calls) and at the regional level (quantification of the systemic intervention effect).

The secondary data will only be available with a considerable delay and could not be included in this article.

Qualification

Qualification aimed at allowing the performance of delegated medical activities in house calls and based on existing specialized competencies is of central importance for the successful implementation of the AGnES project. Basic qualifications in this context are the skills of nurse specialists and medical assistants/qualified medical

Key messages

- The increase in morbidity associated with demographic change and the emerging shortage of physicians is jeopardizing primary medical care in structurally weak rural areas.
- To maintain close-to-home care, the workload of the remaining physicians must be relieved by providing increased scope for delegation.
- The AGnES model demonstrates that medical practice employees, trained by the primary care physician, can provide delegated medical services of high quality.
- Career development as a qualified AGnES employee is an attractive professional perspective for health care professionals and nurses, medical assistants, and qualified medical employees.
- Based on an amendment to the Act in March 2008, the model will be introduced into the regular health care system with effect from 1 January 2009.

employees. In collaboration with the Neubrandenburg University of Applied Sciences, a curriculum for the AGnES project was developed which directly incorporates the practical experience gained in the AGnES projects. Differences in primary qualification and the breadth of experience of the practice employees are individually compensated by appropriate modules (11).

Besides defining the relevant qualifications, the next important milestone for the Evaluation Committee is to establish adequate reimbursement within the catalog of the statutory health insurance scheme for the delegation of patient house call services to medical practice employees. If these efforts are successful on the basis of mutual agreement with the parties concerned, the model projects can be implemented in the regular health care system from 1 January 2009 onwards.

Conflict of interest statement
The authors declare that no conflict of interest exists according to the guidelines of the International Committee of Medical Journal Editors.

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